

Polymer Coating for Tribological Applications



INVENTION

A polymer nanocomposite coating of Ultra-High Molecular Polyethylene (UHMWPE) reinforced with different loadings (0.5, 3, 5, and 10 wt %) of alumina is developed to protect steel surfaces from wear and tear.

Eventhough UHMWPE has low friction and high wear resistance, its used is limited in demanding trobological applications due to poor load-bearing capabilites. Alumina is used here to improve the UHMWPE coating by adding its properties of high hardness retention at elevated temperatures.

MARKET NEED

Friction and wear are key parameters to be managed in tribological applications (interacting surfaces in relative motion). Commercial polymer coatings used in industry are desired to include multiple properties such as wear resistance, temperature resistance, dirt resistance, low friction coefficient, high thermal stability, corrosion resistance, surface hardness modification, ability to increase or decrease lubricant or fluid adhesion (wetting properties), protect against intense heat and extreme pressure, reduce bearing wear and flaking, seizure resistance, operate under high load capacity, prevent galling, long life, non-stick, hardness, thermally stability. Selection of a polymer coating is based on conditions under which the coatings need to work: thickness (1-10 microns), weight, rotational speeds, load ratings, material on which it is applied, working temperatures.

There is growing need for better polymer coatings to improve tribological properties thus revolutionizing component design and manufacturing towards better energy efficiency.

APPLICATION

The intended application of the invented polymer coating is bearings.

ADVANTAGES

- Improved microhardness reaching a maxium of 13.2HV
- Improved wear resistance with no failure noted until 250,000 cycles at a load of 12N and linear speed of 0.1m/s

PROJECT STATUS

UHMWPE nanocomposite powder with alumina loadings was prepared and coated using electrostatic spray gun on a stainless steel substrate.

- Hardness tests were performed
- Sliding tests under dry conditions were conducted to determine its load bearing capacity and wear life under different normal loads

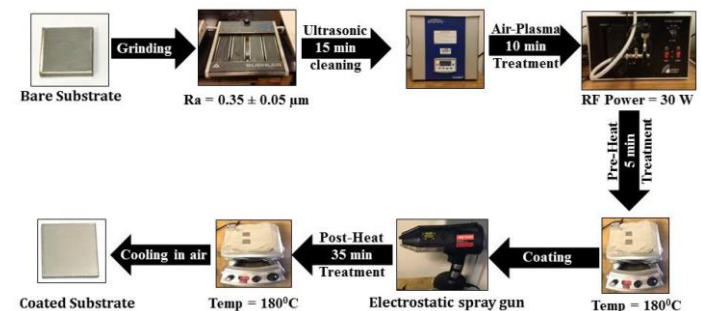


Fig. Steps involved in preparing and Coating

LOOKING FOR A DEVELOPMENT PARTNER

We are looking for a industrial company who deals with preparing polymer coating or using them for industrial tribological applications. We seek industry partnership in exploring a target application for the invented coating (including the operating conditions for the coating), identifying required properties in the coating for the target application and testing / development of the coating to comply to the industrial requirements.

The ultimate objective is to license the intellectual property (IP) to such partner for commercialization.

PATENT PROTECTION

A patent application US16/530,313 covers the polymer coating. The IP is owned by King Fahd University of Petroleum & Minerals (KFUPM).

ABOUT KFUPM

KFUPM was established in year 1963 and is located in Dhahran city of Saudi Arabia. KFUPM currently ranks at 186 in QS World University Rankings 2021. KFUPM's Innovation & Technology Transfer office strives for taking innovation from lab to market place.

For further information please contact
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